

## ABSTRACT

### DEVELOPMENT OF *DEVOPS* AUTOMATION SYSTEM FOR CLOUD COST OPTIMIZATION IN *E-COMMERCE*

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*The advancement of cloud computing technology has become a key element in supporting operational efficiency for e-commerce businesses. However, managing cloud operational costs remains a significant challenge. This study aims to develop a DevOps automation system capable of optimizing cloud resource usage efficiently on Google Cloud Platform (GCP). The system is designed to detect unused or inefficient resources using the Machine learning model Boosted Decision Tree to predict Average Predicted Usage (APU) based on CPU and memory usage data from cloud infrastructure over a period of 10 months (January to October 2024). The model demonstrated excellent performance, achieving an accuracy of 93%, a precision of 98% for the negative class and 88% for the positive class, a recall of 88% for the negative class and 98% for the positive class, and an F1-score of 93% for both classes. Furthermore, the Particle Swarm Optimization (PSO) algorithm was employed to determine the optimal machine type configuration based on APU predictions and resource usage parameters. The system was integrated with a CI/CD pipeline on GitLab to automate the processes of analysis, model training, and resource optimization. The results indicate that the system successfully provided valid recommendations with a success rate of 94% and reduced cloud operational costs by an average of 8.12% during the testing period. Additionally, the system identified inefficient resources, such as unused IP addresses, old snapshots, and unutilized disks, thereby improving overall cloud resource efficiency. This research makes a significant contribution to the development of integrated, automation-based DevOps solutions that can be applied to support cost-efficiency in the e-commerce sector.*

**Keywords:** automation system, DevOps, cloud cost optimization, e-commerce, Google Cloud Platform, Machine learning, PSO, CI/CD.